Remarks

This amendment, which is timely with the accompanying Petition for Extension of Time, is submitted under 37 C.F.R. § 1.116 in response to the "final" Office Action dated June 28, 2006, wherein claims 1 – 31 and 33 were rejected as anticipated by or obvious over the prior art. Applicant hereby seeks to amend Claim 1 to clarify the use of the terms "cure" and "harden" within the present application. Upon entry of this amendment, Claims 1 – 31 and 33 will remain pending. It is submitted that this amendment does not present any new matter or raise any new issues, thus it may be properly entered.

Claim Amendment

Claim 1 has been amended to specify that the polymer matrix is cured such that the adhesive paste hardens. Previously Claim 1 did not specifically state that the curing step involved a hardening of the adhesive paste, leading to confusion over whether the terms "cure" and "harden" were intended to be interchangeable. By this amendment, Applicant clarifies the distinction between the terms.

Traversal of Rejections

35 U.S.C. § 102(b) Rejection

Claims 1, 3, 4, 6, 7, 9 – 13, 16, 17, 19 – 23, 28, 29 and 31 were rejected under 35 U.S.C. § 102(b) as anticipated by Nguyen (U.S. Patent Application Publication No. 2001/0038093). Applicant respectfully traverses this rejection. Claims 1 and 23 require, *inter alia*, that the polymer matrix cures "such that the adhesive paste hardens." This is not taught by the Nguyen reference.

The examiner has argued that, because Applicant did not use the term "harden" in Claim 1 as originally filed, "harden" and "cure" had the same meaning and were therefore interchangeable. Based on this reasoning, the examiner has interpreted the curing of the polymer in Nguyen as the hardening of the polymer. However, as indicated by the present amendment, Applicant distinguishes these two terms. As the terms are used by the Applicant, it is *not* the case that any polymer that cures also hardens. Rather, polymers that harden are a subset of those that cure. Therefore, a reference, such as Nguyen, that teaches a polymer that cures does not necessarily teach a polymer that hardens. Accordingly, Applicant argues that Nguyen does not

teach hardening of the polymer because the reference states that the cured polymer forms "a compliant elastomer," (para. [0018]) where compliant is defined as "yielding and formable at room temperature, as opposed to solid and unyielding" (para. [0020]). Thus, the polymer described in Nguyen cures to a form that is soft and malleable (see also paras. [0014] – [0019]). As such, Nguyen does not teach a polymer that *hardens* when it cures.

The examiner has further argued that the "compliant" cured polymer of Nguyen anticipates the polymer of the present application based on the "elasticity" referred to by Applicant in paragraph [0022] of the specification. Applicant respectfully disagrees. Nguyen specifically teaches that its compliant cured polymer is "yielding and formable" (para. [0020]), which indicates that the polymer does not absorb stresses, but can be shaped or deformed by them. In contrast, the elasticity of the polymer of the present invention allows it to absorb stresses such that it does not deform. Paragraph [0022] of the specification states that the polymer should "have sufficient elasticity to *absorb* any stresses generated by thermal cycling or other mechanical causes" (emphasis added). In other words, the cured polymer should withstand the stresses applied without deforming or breaking down. As described above, the cured polymer taught by Nguyen deforms under stress, thus it does not have this feature. Therefore, the polymer of Nguyen is not a "hardened material having elasticity," as the examiner has argued.

As Nguyen does not teach the element of a polymer matrix that cures such that the adhesive paste hardens, it cannot anticipate Claims 1 and 23. Claims 3, 4, 6, 7, 9-13, 16, 17 and 19 – 22 depend from Claim 1 and Claims 28, 29 and 31 depend from Claim 23 and are allowable for at least the same reasons. Therefore, Applicant respectfully requests that the rejection of Claims 1, 3, 4, 6, 7, 9 – 13, 16, 17, 19 – 23, 28, 29 and 31 be withdrawn.

35 U.S.C. § 103(a) Rejections

Claims 1, 3, 4, 6, 9 – 14, 16, 17, 19 – 23, 28, 29, 31 and 33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Jayaraman et al. (U.S. Patent No. 6,926,955) in view of any of the following references: Kirsten (WO 97/07542), McCormack et al. (U.S. Patent Application Publication No. 2001/0030062), or Pennisi et al. (U.S. Patent No. 5,128,746).

The examiner has argued that the scope of the claims does not support Applicant's assertion that Jayaraman et al. differs fundamentally from the present invention. However,

Applicant believes that the requirement in Claims 1 and 23 that the polymer matrix cures "such that the adhesive paste hardens," provides such support for a distinction between Jayaraman et al. and the present invention. As discussed above, and contrary to the examiner's interpretation, a polymer that "cures" is not necessarily one that "hardens." Jayaraman et al. teaches a polymer that cures, but does not harden, as the term is used in the application. The polymer in Jayaraman et al. is a "phase change polymer" that becomes fluid when heated to the operating temperature of the electronic device. This is in contrast to the polymer of the present invention which has hardened and remains a hard solid at such operating temperatures. Additionally, Jayaraman et al. specifically teaches that the types of phase change polymers used are a *soft* solid at room temperature (col. 2, lines 12-15).

Further, although Jayaraman et al. and the present application both disclose a polymer matrix that can include silicone or epoxy polymer resins, this is not a teaching that the polymers have the same features or properties. The properties of the polymers of Jayaraman et al. and the present invention are fundamentally different, even though they may contain some of the same substances, at least because the differences in composition result in divergent responses to heat. Jayaraman et al. teaches polymers that change phase when heated, whereas the present application specifies that the polymers are hardened such that they should be able to withstand thermal stresses. Thus, based on at least this difference, the Jayaraman et al. reference does not teach polymers that harden when cured. Further, the basic principles of Jayaraman et al. require phase change polymers because it is necessary to the workings of the invention that the polymer flows into cavities when heated. Therefore, it would not be obvious, nor would there be any motivation, to substitute a polymer that hardens.

The examiner has argued that the combination of Jayaraman et al. with Kirsten, McCormack et al. or Pennisi et al. is proper because the "motivation to include the fluxing agent to remove surface oxides from the solder powder and allow the solder powder to better wet out is not dependent upon the particular curable polymer used." However, Applicant notes that neither this argument, nor the rejection itself, indicates *what* the motivation for such a combination is or *where* such a motivation can be found. Applicant suggests that no such motivation exists because the addition of fluxing agents to a phase change polymer would destroy the function of the invention. Jayaraman et al. teaches the use of metal oxides as non-fusible fillers, thus the addition of a fluxing agent that removes surface oxides would seem highly likely to affect the

fillers such that the invention of Jayaraman et al. would not work as disclosed. As such, one of ordinary skill in the art would not be motivated to combine or find it obvious to combine these references.

Therefore, because Jayaraman et al. does not teach a polymer that hardens and because it would not have been obvious to add a fluxing agent to Jayaraman et al., Claims 1 and 23 cannot be held obvious over these references. Claims 3, 4, 6, 9 – 14, 16, 17 and 19 – 22 depend from Claim 1 and Claims 28, 29, 31 and 33 depend from Claim 23, and are allowable for at least the same reasons. Accordingly, Applicant respectfully requests that the rejection of Claims 1, 3, 4, 6, 9 – 14, 16, 17, 19 – 23, 28, 29, 31 and 33 be withdrawn.

Claims 1, 3, 4, 6, 7, 9 – 14, 16, 17, 19 – 23, 28, 29 and 31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Nguyen in view of Jayaraman et al.

The examiner has argued that the combination of Jayaraman et al. with the Nguyen reference is merely to show that in a similar process, heated solder powder reflows to form interconnecting metal structures while the curable polymer is cured. The examiner has not, however, provided any motivation for the combination of these references. The polymers in Jayaraman et al. and Nguyen are substantially different based on the phase change property of the Jayaraman et al. polymer. There has been no showing that the polymers are compatible with each other, and, absent some motivation, these references cannot properly be combined. Thus, Applicant requests that the rejection of Claims 1, 3, 4, 6, 7, 9 – 14, 16, 17, 19 – 23, 28, 29 and 31 be withdrawn.

Claim 33 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Nguyen.

As discussed above, Nguyen does not teach a polymer that hardens when it cures. It would also not have been obvious to one of ordinary skill in the art to use a polymer that hardens in Nguyen because Nguyen specifically teaches away from a "solid and unyielding" material (para. [0018]). Accordingly, Nguyen cannot make obvious the features of Claim 33 and Applicant requests that the rejection be withdrawn.

Claims 2, 5, 7, 8, 15, 18, 24 – 27 and 30 were rejected under 35 U.S.C. § 103(a) over various combinations of the above references in view of several additional references. In view of

the foregoing comments it believed that independent Claims 1 and 23 are allowable, accordingly, all of the dependent claims should also be allowable

Conclusion

In view of the foregoing amendment and remarks, it is believed that the application is now in condition for allowance and favorable action is earnestly solicited. The examiner is invited to call the undersigned, at the telephone number listed below, if doing so might advance the prosecution of this application.

Respectfully submitted,

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